(2)

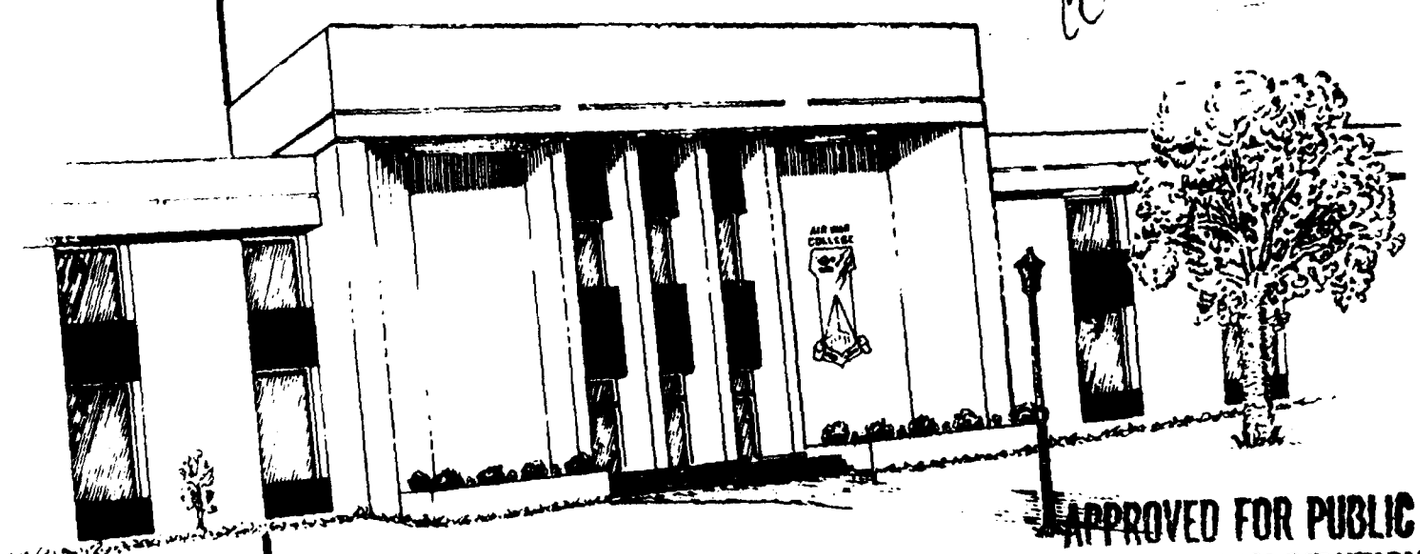
AIR WAR COLLEGE

RESEARCH REPORT

THE TREDEGAR LOGISTICAL SUPPORT IN THE AMERICAN CIVIL WAR

LIEUTENANT COLONEL TED T. SQUYRES

1989



AIR UNIVERSITY
UNITED STATES AIR FORCE
MAXWELL AIR FORCE BASE, ALABAMA

AIR WAR COLLEGE
AIR UNIVERSITY

THE TREDEGAR LOGISTICAL SUPPORT IN THE AMERICAN CIVIL WAR

by

Ted T. Squyres
Lt Col, USAFR

A DEFENSE ANALYTICAL STUDY SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE CURRICULUM

REQUIREMENT

Advisor: Dr. Howard Hensel

MAXWELL AIR FORCE BASE, ALABAMA

May 1989

DISCLAIMER

This study represents the views of the author and does not necessarily reflect the official opinion of the Air War College or the Department of the Air Force. In accordance with Air Force Regulation 110-8, it is not copyrighted but is the property of the United States government.

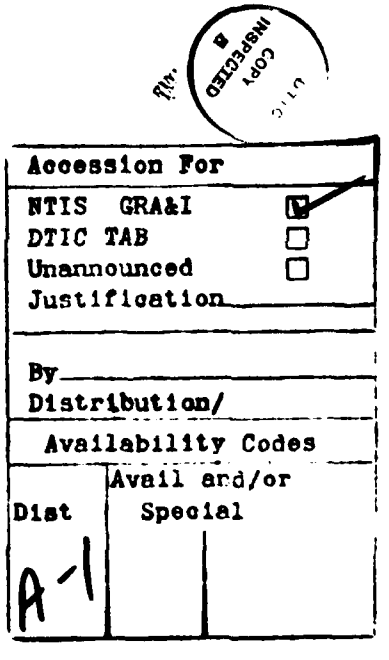
Loan copies of this document may be obtained through the interlibrary loan desk of Air University Library, Maxwell Air Force Base, Alabama 36112-5564 (Telephone: [205] 293-7223 or AUTOVON 875-7223).

EXECUTIVE SUMMARY

TITLE: The Tredegar and Logistical Support in the American Civil War

AUTHOR: Ted T. Squyres, Lieutenant Colonel, USAFR

An examination of a Richmond Virginia ironmaker during the period of the American Civil War. Major emphasis is to look at the logistics involved in supply of war materials, especially heavy iron works and the production of cannon. Examines the complexities of the iron industry in the South, and the crucial role of industry in the conduct of war. Also briefly looks at the direct battlefield influence of civilian industry, and draws a comparison with modern day industry and war production potential.



BIOGRAPHICAL SKETCH

Lieutenant Colonel Ted T. Squyres (B.S. La. Tech University, MS Auburn University) is a career Air Force Reservist. He has served as an Air Reserve Technician at four units and as a Statutory Tour Officer. He has served at two numbered Air Forces, Hq AFLC and at several Wing/Squadron organizations as a logistics and Aircraft Maintenance Officer. Colonel Squyres served in Vietnam as a maintenance Control Officer with the 14th Special Operations Wing. He is a graduate of the residence courses of both Air Command And Staff College, and the Squadron Officer School. Colonel Squyres is a graduate of the Air War College, class of 1989

LOGISTICS

The Tredegar

Logistical Support in the American Civil War

LOGISTICS.

Logistics has proven to be the key player in many battles throughout the history of mankind. On few occasions, battles have been won or lost without regard to logistics but this has been rare. Almost without exception, logistics has played a major role in the outcome, and in the future of the countries involved.

This paper will deal with the issues of logistics, and how they played in the support of the war effort for the Confederate States of America, during the American Civil War. In particular, this paper will deal with the Tredegar Iron Works, located in Richmond, Virginia. The Tredegar played such a major role in the war that the outcome of battles, and the flow of the war itself can be traced directly to the support that she gave to the Army. I will show this by briefly looking at the Confederate Supply system, and then look specifically at the Iron Works, and the equipment, ordinance and supplies that were produced in direct support of the war effort.

The Confederate Supply System

Logistics in the Confederacy was a study in perseverance and strained economy. In the beginning, some resources were fairly available, but it quickly became evident that additional supplies for the army were going to have to come from sources abroad, such as England and Europe.

In the Confederate arsenal there were a considerable number of

heavy seacoast guns at some of the fortified sea ports. Others were seized on board men-of-war at Norfolk and among the stores of the Norfolk navy yard. But there was little serviceable field artillery except a few old iron guns of 1812 and a few more modern pieces belonging to the States. There was scarcely any gun powder save 60,000 pounds, mainly old cannon powder at Norfolk. And there were practically no arms for cavalry, no fixed ammunition nor percussion caps, no cartridge boxes, knapsacks, haversacks, etc.--no saddles and bridles, no artillery harness, no adequate stores or shoes nor any horse shoes, nor provision of the many minor articles of equipment required by an army in the field. (10-2) President Jefferson Davis aptly summarized the status of the Confederacy and its ability to assemble logistical resources, when he said, "it soon became evident to all that the South had gone to war without counting the cost. Our chief difficulty was the want of arms and munitions of war." (10-1)

The South believed the great nations of Europe were dependent upon Southern cotton to support their industries. David Christy put forth this important philosophy in his well known book, Cotton is King. This idea nurtured in the bosom of Southern gentlemen and their children until it became an integral part of their world. They reasoned that neither France nor England would allow the cotton supply to be endangered; that the wheels of world industry would cease to turn without Southern cotton, that the North could not wage war successfully against a people who controlled the production of their great staple.(12-3) However, other nations soon found additional sources of cotton and the South's false sense of economic security soon faded.

One of the early efforts in securing supplies, and arms was through the use of procurement agents of the Confederacy. One of the first and most able of these agents was Captain Caleb Huse. He was dispatched to England in 1861 with authority to contract for the Confederacy in the purchase of arms and equipment. Purchases were made with an initial credit of £10,000. He very soon made contracts to the extent of nearly fifty times that sum.(10-2) Huse continued his complex duties as foreign purchasing agent and Huse made agreements for the trade of cotton alone, rather than using cash. This process quickly became complicated since this cotton had to be delivered through the blockade which had been set up. A great deal of materials were purchased and delivered through agents both at home at abroad, however, this did not meet all the requirements of the Confederacy.

An additional logistics burden, which never did seem to go away, dealt with interstate manufacturing and transportation. Each state initially manufactured and supplied its own forces, and was not interested in equal distribution among other states. This was part of one of the major dilemmas of the war. The South wanted States Rights, but in order to be a unified country, they had to have a common government, centralized control, and an equitable tax. But this was almost impossible to achieve. Some Governors actually furloughed their militia for extended periods, when they were sorely needed in battle. When the southern states began seceding, all arms and ordinance supplies of the United States were claimed by the several States in which they were found.(12-2) The delay caused by the necessity of negotiating their

transfer to the custody of the Confederacy cost a great deal of time, and was detrimental to the cause of the war. This was a continuing problem throughout the war and had obvious effects on the conduct and outcome of the war. In supplying the Confederacy with ordnance and equipment of many types, a single prominent Southern industry, the Tredegar Iron Works of Richmond Virginia, played a crucial and vital role.

The Tredegar

Iron Maker of the Confederacy

The Tredegar

Prior to the start of the Civil War, industry in the south had developed to a great degree, but the majority of this development was in agriculture, mainly in cotton and tobacco. As earlier stated in this paper, cotton was thought to to be a great mainstay and future financial producer for the South. However, the war changed so many things that cotton's demise, as well as the South's demise could not or would not be seen by the Southern people. Not only had cotton and its associated grand life style become a part of the South, key Southerners and Plantation owners thought Southern society invincible. The affluent life style and tremendous prosperity had become a "way of life" for the South, and Southerners thought the war would be a short one. No one could conceive that it would be any other way. But early in the 1800's, developing industry around Virginia would play a key role in the ability of the South to wage a war.

In the region around the Virginias, a tremendous coal industry flourished. Lands were rich and the needs of the fast expanding country placed great demands upon its heavier industries. While cotton was king throughout the south, Richmond, along with a few other cities had developed a considerable industrial base. During the early 1840's, nearly two million tons of coal shipped out of the port of Richmond.(3-1) Virginia supplied the mills and furnaces of industry all along the Eastern Seaboard. Richmond lay in perfect position to both the North and the South to provide this strategic material, and business was substantial. Richmond was positioned on the James River, and use of the Great Falls gave the tremendous resource of waterpower to the industry. Adjacent to

the James, and a vital part of the Tredegar, was the Kanawha Canal. Often times location of a business plays an important role in the progress of the business, and the Tredegar was no exception. The firm was a primary producer of iron and finished products, and was located at strategic waterway points, and with other key industries of tobacco, banking, and financial interests. Growth and future potentials were infinite.

Shortly after the first iron was produced at Pittsburgh, the iron industry began in Richmond. In 1836 the Belle Isle Manufacturing Company began production on an island in the James River, just above the great Falls. In the following year, the Tredegar rolling mill started into action on the mainland. An engineer trained at the famous iron works at Tredegar, Wales, designed the new mill and it was named after the Welsh works in his honor.(6-3) Also at this time the Shockoe Manufacturing Company, and the Virginia Foundry Company followed. One of the founders of the Tredegar, Francis B. Deane united his mill and forge with the foundry of the Virginia Foundry Company. Virginians hastened to take up the stock, and in January 1838, the Tredegar Iron Company began its fateful career. (3-166) By 1860, including the various departments of the Tredegar Iron Works there were four rolling mills, fourteen foundries and machine shops, a nail factory, six shops for manufacturing iron railing, two circular saw works, and fifty iron and metal works. (3-168)

As with many new businesses, financial success was not found immediately. While a great deal of progress was made, a great debt was also accumulated by the Tredegar. At this point in the history of both

Virginia and the Tredegar, Joseph Reid Anderson came to work at the Tredegar, and eventually formed it into a tremendously successful enterprise, and actually made it possible for the Confederacy to perform as well as it did by producing such a tremendous amount of iron products for the Confederate Army.

Anderson began his role with the Tredegar as an agent. For almost two and one half years, he functioned as an agent. For the next five years he leased the company, and in 1848 became its owner. At this stage in the life of the Tredegar, Anderson produced an annual profit of $48,000. In 1846 it was $98,000. In doing so, he produced for the United States, chain, shot , shell, and heavy guns. By 1860 he had built the Polk, an iron clad revenue cutter, manufactured the boilers and machinery of the twin frigates Roanoke and Colorado, and furnished the United States War and Navy Departments with twelve hundred cannon. (3-2) Anderson was a West Point graduate, and had left the service to work in industry. His dealings with the industrial giants of the North were sound and profitable, but the near future and the American Civil War changed both his fortune and his Northern ventures.

Civil war in any country is a terribly confusing event, and the flow of business between old friends and businessmen, who now become new enemies, takes unusual turns. Since the North was strong in industrial might, and hungry for the Tredegar's products, Anderson established many good customers there. Even after the war had begun, he continued to do business with his contacts in the North, and for a while the North provided

supplies and munitions production to the South, and also provided a great deal of raw materials. At the confusing time of the secession, contracts continued to flow back and forth between North and South. The North had made the decision to modify all their old flintlock muskets to percussion, and it was deemed cheaper to bring all the flintlock arms in store at Southern arsenals, to the Northern arsenals and armories for alteration, rather that to send the necessary machinery and workmen to the South. Consequently, the Southern arsenals were stripped of their deposits, which were sent to arsenals all over the North. After the conversions were completed, the Southern arsenals were again resupplied with about the same numbers as before. perhaps slightly augmented.(9-93) There was a great deal of concern over issues such as these, for in fact the North, using Southern companies like the Tredegar, was rearming the South just prior to the Secession, even thought unwittingly.

Slave Labor

Through much of the history of this country slave labor has been thought to be the cause of the Civil War. Not so, according to historical documents. A particular emphasis on their perspective was tied to the southern states, although slave labor was used in many other states as well. The primary use of the slave labor was in agricultural production, mainly cotton and tobacco. Use of slaves in manufacturing was not well known, but was widely used in some areas. The use of slaves in Virginia, and especially Richmond, was very pronounced. Throughout the records of the Tredegar, slaves were used, taxed and housed throughout all of the civil war, as well as before and after. This was contrary to the popular opinion that slaves could only be used for agriculture. Most of Europe and the free states in America felt that "even had there lived in the Commonwealth persons of more modern ideas, they could never have conducted successful factories under the slave regime, since as some say, slavery prevented the accumulation of capital, and as others hold, the Negro slave could only be profitable in agricultural employment(2-1).

The Tredegar made a marked exception to use of slaves in agriculture only, and in fact, made some remarkable advances in the use of slavery and its incorporation into the then prominent white work force. This was done over time but not without problems. While mainly thought of as agricultural workers, slaves were used in both the coal mining and the iron making industries in Virginia, long before the civil war. Virginian industrial policy had always considered it an object of primary importance

to employ slave labor generally in the several branches of iron making. Until 1835 or 1836 the policy had been successfully carried out.

The Spotswood furnaces were conducted by slave labor; Negro slaves trained to mould and cast cannon were employed at Westham foundry, the state government works near Richmond, during the War of the Revolution; Thomas Jefferson set his young slaves to making nails; and throughout the valley, the chief iron manufacturing region of Virginia before 1840, Negro slaves constituted the bulk of the labor. (2-3) The Tredegar was an early employer of slaves. As she continued to be a strong industrial force in the Virginia and Richmond area, many citizens grew to be dependent on her for both employment, community and economic leadership. In that role, she functioned quite well. From its conception in 1837, the Tredegar quickly became a nationally important company. Its influences and revenues were critical to the support of the area, and the iron production, critical to the industrial base of the country. The use of slaves at the Tredegar was a result of a purely business decision, the making of higher profits.

As new head of the iron maker, Anderson proposed several continuing changes. In 1842 he stated that the Tredegar could not depend on a local market alone, and in order to compete more widely, changes were made. To compete successfully required that the cost of iron be reduced. To do this, they must reduce the cost of labor. (2-4) Here, Anderson proposed the use of slaves. At this point in time the American iron industry was in a depressed state and changes like this were most

opportune. Anderson's immediate calculations showed, under the same current conditions, that he could save approximately $11,000 in the annual cost of labor by using slaves rather than the existing system. His proposal was received favorably by the company board and processes were placed into motion to bring slavery into the Tredegar in a much more prominent manner. Slavery continued to supplant free until by 1864, Negroes held well over half of all Tredegar jobs. (6-250)

As stated earlier, changes of this type were made purely based on business and economics, but in a few short years, the impact on the then existing white labor force was very dramatic. The slaves were fully incorporated into most major functions of production with a great deal of success. In 1847, when a great expansion took place at the Tredegar, Anderson elected to spread his then competent slave workers throughout the plant, and let them assume more responsible positions. The white forces then were also spread out and became trainers of additional slave workers. The whites perceived this management decision as a threat to their job security. This was not the case, but often perceptions were stronger that facts and the new use of the slaves became a real problem.

On 22 May 1847, the white work force gave notice that they "would not go to work unless the Negroes be removed from the puddling furnace at the new mill-likewise from the squeezer and rolls at the old mill." They also demanded higher wages. Further it was formally stated "Gentlemen You need not light up the furnaces Monday, nor any time until you comply with our resolutions."(11-1) Anderson's reply was both bold an intuitive

He had been challenged, and with the pressing needs of expansion and absolute production requirements, he dismissed those employees who pressed the demands. Anderson know that slaves had been used for years in the Virginia industrial component and he knew that their use would continue. He also realized that salve labor reduced his costs, raised his profits and allowed him to pay higher wages to his white work force. Therefore, he had no choice but to meet this challenge. These views were shared by the business community as well, so Anderson had support of all but the strikers.

As an additional comment on the use slavery, Joseph Anderson made a great use of them, but was also very generous in his personal dealings with the slaves. According to the Tredegar Journals and business letters, slaves were often hired from their owners to work at the Tredegar, and allowed to return home for the great southern feast of Christmas, and other such days. In looking at the treatment of slaves, it was found that discipline was not a real problem. Slaves were afforded decent accommodations and wages, and were allowed to work overtime for additional pay, which they were free to spend as they saw fit. According to a 13 Dec. 1845 letter from the Tredegar letters book, there is a documented case of a slave named Emmanuel Quivers coming to the Tredegar, upon good recommendation, with the request to work and pay for his freedom. This was in fact done to the satisfaction of both sides.

Slavery was a great boon to the Tredegar and continued to profit the company greatly. The Tredegar Journals form 1844-1852 indicate

total profits as follows:

1844-------$47,732.01

1845--------75,669.80

1846--------98,272.40

1847--------62,190.07

1848--------35,447.94

1849--------42,798.11

1850--------45,135.92

1851--------41,635.82

1852--------62,839.27

This was obviously due at least in part to he successful use of competent slaves.

A typical work day in depicted as follows and is a compilation of Tredegar Journal and Tredegar letter books: A bell rang in the Tredegar yard at half past five in the morning, The working day lasted ten hours with three quarters of an hour at noon for dinner. But food dear to the palates of the slaves, hog meat, cabbage, turnips, corn bread, molasses prepared by women cooks in the quarters, which were pressed close to the mills was plentiful. And after the official day ended the slaves practically became their own masters. If they pleased they might labor overtime and win pocket money. The iron worker as a rule being a picked lot, industrious and intelligent, many of them utilized the privilege. Some made from ten to fifteen dollars a month. At Christmas the ironmaster

made small gifts of money to his hands, and during the year each man was provided with a cap, shoes, and suits of outer and underclothing appropriate to the season. (2-18)

So in summary, the slave labor force was a profitable one for the Tredegar, and although no slave conditions could be described a good for the slave, conditions at the Tredegar probably were as favorable as could be had at this period of time. As Anderson predicted early in 1842, slavery was the way for higher profits and higher production for the Tredegar. The success of the company, their profits, production and achievements, attest to this fact.

Trade labor and Technicians

The Tredegar, since its inception, had many periods of ups and downs, but throughout its history, continued to produce a valued product. Her labor force was skilled and competent and continued to operate at high levels and standards. When the Civil War started, a considerable number of men were lost to the Confederate Army. This greatly hurt the Tredegar but she continued to produce. The most notable loss in this manner was Anderson himself. On September 3, 1861, he received his commission and was sent to take charge of the coast defenses of North Carolina.(3-261) His commission was as brigadier general. He assumed field command of a brigade, but agreed to return to the foundry if the need arose. He fell wounded during the Seven Days Campaign, and resigning 19 July 1862, returned to the Tredegar. (7-762)

Throughout the entire war period, one of the major problems that continued to plague the Tredegar was a shortage of raw material. A second problem was labor. Work at the foundries was hard manual labor. Summers were hot and work at the furnaces was particularly demanding. Prior to the war, in July 1844, Anderson's white labor had severely curtailed his operations by refusing to come to work during the summer months. (2-13) Several years later, in another labor issue, then Secretary of War, Randolph signed a letter to the Tredegar to provide that the bulk of the white furnace workers were to be exempted from military duties for the purpose of working at the foundries, and those iron makers who were already in the military, were to be detailed to the Tredegar rather than stay with their military units. As with many arrangements made in large

organizations under pressing circumstances, these agreements also were not kept. Three weeks after the April agreement, Anderson requested that the Secretary detail a total of nineteen blacksmiths and machinists from the army to the Tredegar. Randolph's reply was: "It has been found that so many of the detailed men abandon their work, that details are only granted now in small numbers and in special cases. Request for details denied." (6-229) In further correspondence, a letter was written to the Secretary requesting that the question of detailing men from the army, be put directly to the Commanding General in the field. The Secretary's actions still produced no details. His total action was merely to write on the letter the word, "File". (6-231) As a result, absolutely no action was taken. Further communication directly with General Lee led to the same response, virtually no details. The field forces were concerned with troop strengths in the field, not with production problems back in the logistical train. Throughout the war, labor continued to be a severe problem. Attempts were even later made to draft the white work force at the Tredegar, however Anderson managed to retain his force, even after the government made a diligent inquiry as to how effectively the men were used at the foundries.

As the war continued, the government encouraged the use of slaves, since the army was always in desperate need of all the forces it could muster, and would continue to be throughout the war. The timeliness of Anderson's decision to use slave labor years before the war began, was most fortunate. Since the numbers of available white workers became smaller and smaller, the use of slaves not only proved to be profitable, and

productive, it also proved to be the only way the Tredegar could operate through the war.

The Tredegar Battalion

The American Civil War was resplendent with unique forms of management and innovations. At the Tredegar this took form as the Tredegar Battalion. The Tredegar was a tremendous influence in the Richmond and Virginia area. Her production volume, and the monies associated with that output, directly affected the lives of many Virginia citizens. When the war began, Anderson was a strong secessionist, and was firmly behind the Confederacy. In fact, in an early visit to President Davis in Montgomery, he offered to turn over the Tredegar to the Confederacy but was refused.(2-169) His efforts to support the secession then were directed toward successfully operating the plant and producing iron and equipment for the Confederate armies.

The Tredegar Battalion was organized, commissioned and armed by the Governor of Virginia, for home service on 3 June 1861, and had an effective force of at least 300 men, rank and file. While this battalion was in ardent support of the Confederacy, it was made up of the laborers and mechanics who were still primarily responsible for iron production. This use of the workers as iron producers versus Battalion members continued to be an on going battle between the Secretary of War and General Anderson, but the production of iron was the primary concern.

The Battalion's organization was unique in that it was composed only of members of the Tredegar. The company provided housing for its Battalion and other employees, as well as clothing and food. During the war, it became a tremendous task to both produce iron and provide for all

the basic requirements of such a large number of people. So in addition to labor and raw materials problems, General Anderson had to contend with feeding and caring for the several hundred employees plus families, as well as treatment of the concerns of the battalion. In the Tredegar letterbooks, of 1864, management had to impose rationing of foodstuffs. In order to feed all, they were required to accumulate over 300,000 pounds of bacon, 600-700,000 pounds of beef and some 40,000 bushels of corn plus additional corn and hay for horses and mules. The Tredegar logistical efforts here were phenomenal. The ability of the ironmaster, his audacity, resource, and success were never more needed or more boldly demonstrated than in the able manner in which he fed and clothed his force and their thousands of dependents. This was when Confederate armies were half-naked and starving, not as is commonly believed from a paucity of food in the Confederacy, but from the inability of those in control to collect and distribute it.(3-260) Anderson was able to master his logistical requirements.

To supply his people, hogs and mules were brought from Tennessee. And in fact, the Tredegar butchered over 2,000 hogs in December 1862 and sold the meat to workers at costs. They even furnished 25,000 pounds of bacon to the War Department and 2,000 pounds to the city of Richmond. (6-156) Corn was continuing problem and no real solution was reached until a deal was struck with rail road interests in Georgia to trade iron production for corn. A tremendous series of problems with transportation, Federal troops destroying bridges, and impressment by local authorities greatly delayed the badly needed corn but it finally began to arrive at the

Tredegar works by a clever trade practice that Anderson and his agents set up. It was an ingenious approach to solving real war time logistical problems.

In the Richmond Dispatch, dated January 28, 1864, ran the following "We will exchange coal, iron or nails, for corn, corn meal, hay, flour, beef or bacon, for the supply of our iron works in Western Virginia and in this city, for fair terms. (6-160) As food supplies were critical to the operation of the Tredegar, so were all other items such as leather and cloth. Not only were the basics required for the workers and their families, but they were also needed to maintain the battalion as well. Upon the attack of Richmond itself, the Tredegar provided fighting forces time and again. From July 1, to mid October the battalion was drawn full time into the field.(3-263) Through all this quality cannon for the defense of Richmond were produced and delivered quickly, and laborers also functioned as soldiers.

Cannon

At the onset of the Civil War, industry throughout the South was not nearly as well established as it was in the North. With agriculture as the primary industry, major industrial expertise was not a dominate force in the South. This is not to say that there was no industry, but it was a fact that major industrial production belonged to the North. Large quantities of goods flowed to the South from both the North and from abroad.

When the war began and General Scott implemented the Anaconda Plan, those industries in the South was not highly developed. New Orleans was a major seaport and had some considerable industrial strength, however, she and her shipping and industrial capacities were lost fairly soon into the war. Charleston and the Carolinas held a great deal of influence in both shipping and some textile industries. The Gulf Coast also had considerable capabilities. As the war progressed, foundries and armories quickly sprang up throughout the South. By 1861 the following arsenals and depots were at work, having been supplied with some machinery and facilities, and were producing the various munitions and equipment required: Augusta, Ga.; Charleston, S.C.; Fayetteville, N.C.; Richmond, Va.; Savannah, Ga.; Nashville, Tenn.; Memphis, Tenn.; Mount Vernon, Ala.; Baton Rouge, La.; Montgomery, Ala.; Little Rock, Ark.; and San Antonio, Texas-altogether eight arsenals and four depots. (9-75)

Richmond itself was probably one of the leading industrial centers for the South. As was stated earlier, Richmond was a major Center for banking, tobacco and iron. With the development of the Tredegar iron

industry, its economic and military influences became extremely important in the conduct of the war. In field artillery, the Civil War production was confined almost entirely to the Tredegar. (9-71)

At the outbreak of the war, the Tredegar was in a most unusual position. She was under contract with the United States to provide shot and shell for the U.S. Navy, and a considerable number of cannon as well As the secession took place, General Anderson actively supported the South, but continued for a long as possible to do business with his old associates in the North. When the war began he was in process of acting as agent for the southern states in refitting muskets to percussion, and actually continued this operation with northern companies until the North stopped any arms or munitions flow to the South.

Cannon were produced at the Tredegar since its early inception. On April 1, 1865 The Richmond Enquirer stated that from July 1, 1861 to January 1, 1865, the Tredegar produced 341 Columbaids and siege guns and 1,306 field pieces . Before the war had begun, a new type of technology had been introduced for the casting of cannon. The previous method was to make a solid casting. Contracts from the Union had been given to several manufacturers for cannon with explicit instruction to use the New Rodman technique. This technology called for a water cooling procedure, and for casting around a hollow core. Anderson and company were firmly opposed to his new procedure and had been continuously petitioning Secretary of War, the Honorable John B. Floyd to accept the solid casting technique but to no avail. Anderson's last request was in November 1860. (1-7) Floyd

still turned him down however, and pressed for delivery under the new process. In order to do this Anderson would have to add new equipment and change his manufacturing philosophies, neither of which he was willing to do. Anderson at first failed to realize the value of this method, and though he hurried to install it at the Tredegar late in the war, the foundry produced only two 12 inch Rodmans using this method. (7-762)

A most important organization of the Confederacy, and one which worked directly with the Tredegar was the Confederate Ordnance department. This department under Brigadier General Gorgas, did a great deal toward increasing the effectiveness of the Confederate Army through control and distribution of cannon and related equipment, produced by the Tredegar. As was stated earlier, raw materials were crucial to the war efforts, and organization and supply were of paramount concern. Shortages of materials led to organization of the Nitre and Mining Bureau and of thousands of workers were assigned to the Bureau in many places where materials existed. The Ordnance Bureau originally consisted of one Brigadier General, one Colonel, and of such additional number of field officers, Captains, and First Lieutenants as the service required. They were artillery officers on ordnance duty. (6-89) As with other large organizations, this Bureau continued to grow. By 1862, Congress created fifty positions, and later added up to two hundred more.

Under the direction of the Ordnance Bureau, the production of large guns, in large quantities took considerable efforts in organization of supplies, equipment and laborers. As the war continued to progress, even heavier burdens were placed on the Tredegar to increase production and

quality as well. Some early models of cannon, the eight and the ten inch Columbiads and 4.62 inch rifled siege guns were rushed to defend against McClellan's Peninsula Campaign in the Spring of 1862. In the haste to support the additional war efforts, and as part of the increasing production schedule, it appeared that the quality of cannon produced at one point suffered considerably. Confederate commanders were not pleased with the quality of the guns. When more Tredegar cannon were shipped to Yorktown, General A.P. Jill left the pieces lying on the warf because he was afraid to fire them. In all, four or five Tredegar rifled cannon burst during the month long siege (6-180). After complete inspections, some cannon were recast, but the Tredegar continued to enjoy a good reputation as a quality producer of cannon. To keep their good reputation was not a simple operation, and took considerable efforts. After many questions and a great deal of consternation, among the field commanders and General Gorgas, the quality of raw materials and more concentration to details at the Tredegar improved production methods and the quality of cannon being produced.

While Anderson was reluctant to convert to the Rodman casting procedure, he was willing and most able to be creative and resourceful. Immediately prior to the opening of the Seven Days Campaign, General Lee ordered a new weapon to be built. He requested an ironclad railway car with a mounted heavy gun. In cooperation with the Navy, plans were quickly drawn, two inch armor plate was diverted from the gunboat Richmond, and within 10 days a finished weapon was on the rails. General Lee had his new formidable weapon, the world's first railway iron clad

with a 32 pounder Brooke Gun. It was first used on June 29, 1862 with great success. In addition to this unusual weapon, the Tredegar was also extremely busy during this Campaign with routine production, which was remained at a high level. According to the Tredegar Gun Foundry Book, during April 1862, seventy two cannon were cast, the highest monthly total of the war. Many of these pieces were bronze six pounder guns and twelve pounder howitzers, made from the bells of southern churches.

While many different types of guns were built, three models dominated. An iron three inch rifled gun a twelve pound howitzer and a six pound smooth bore. As mentioned earlier, suitable raw materials, both in quality an quantity led to less that desired products, but production remained fairly high and overall quality fairly good. Between 1861 and 1865 the Tredegar had supplied nearly eleven hundred cannon to the Confederate cause. (3-170)

As the war continued, new technology and changes continued to play a part in production. The Tredegar works in the spring of 1861 became the Confederate headquarters for scientific experiment. Here iron plate was rolled to create the first American ironclad; here possibly was built the first submarine boat engaged in warfare, here the first torpedoes, torpedo tanks and chains were made; here were cast the first of the celebrated seven-inch Brooke rifled naval guns for throwing solid bolt shot, the Williams machine gun and the iron Napoleons. (3-170) Use of these weapons caused direct changes in the Tredegar production.

After competing with Federal artillerists, it was quickly determined that better types of pieces needed to be made. Production was stopped on the twelve pound howitzer and six pounder guns. The twelve pounder Napoleons of the Union forces, proved to be the weapon most needed. So production was changed. Other new types also were added. A thirty pounder Parrott rifle captured from the Union was another new type urgently needed. In only two weeks, the first of the new thirty pounders was cast and by the next month the first bronze Napoleon was produced. So the Tredegar was able to adapt quickly to General Lee's needs and requests. Cannon for the army became a tremendously important part of the Confederate war fighting capability. General Lee, as the creative genius of the war, requested additional twelve pounder Napoleons be made by melting down existing cannon and recasting. This initiative proved to be one of the major efforts of cannon production during the war. While shortages of raw materials continued to be a major problem. Production was as good as could be expected until the devastating May 1863 fire. Cannon production was crucial to General Lee, and with his limited resources, Anderson made remarkable progress.

The Blockade

The Union under General Winfield Scott had conceived a blockade of the South as one of the first orders of business to conduct once the war broke out. This blockade extended all along the coastal states and up the Mississippi River and was intended to stop the flow of goods into and out of the South. It was effective in some quarters, but not in most as a large percentage of goods made it through. The most successful method was to ship goods to the Sea Islands in large steamer, under a neutral flag, where the were reloaded into small fast steamer for running the blockade.(8-8) The Navy shipped almost exclusively to Nassau, Havana, and Bermuda. (4-233) Agents were appointed at these locations to handle the shipments. Very large quantities of goods were shipped in this manner, and it was extremely difficult to stop this process. The U. S. Navy had a very small force to enforce a blockade for the entire eastern U. S. area and were in large part unsuccessful in their efforts.

The Ordnance Bureau, organized under Major Gorgas handled moving their logistical needs through the blockade in a different manner. Of all the attempts, theirs was the most successful. They actually purchased four steamers, the Robert E. Lee, the Merimcac, the Eugenie, and the Phantom. They were highly successful in slipping out with cotton and back in with leather, flannel, Blakely guns and other much needed supplies. The Robert E. Lee was a vessel capable of stowing six hundred bales of cotton. This vessel was kept running between Bermuda and Wilmington and made some fifteen to eighteen successive trips before she was finally captured. (9-79) Throughout the war, a tremendous job was done in setting up

armories across the South and in producing arms, but over four times as many small arms were brought through the blockade as were produced at the combined armories at Richmond, Fayettville and Ashville.(12-24)

Most medicines and medical supplies came in through the blockade and through enemy lines. (8-129) The issues of States Rights and separate sources of supply were continuing problems during the war. Human nature, the concept of profits, and the confusion of States Rights issues resulted in shortages of critical supplies, even, ironically a shortage of cotton goods.

Tremendous profits were continually made by blockade runners. Although the risk was high, the profits were even higher. Supplies that were brought were invaluable and were much needed by the Confederacy. Iron and related production at the Tredegar was not directly affected by the blockade, but was definitely indirectly affected. The shortage and inability of the South to produce all her war goods wrecked havoc on the economy. Shortages of food foodstuffs and accouterments led to high prices and these factors continued to affect the industry in the South, and primarily in Richmond. The shortages of leather and similar articles did directly affect the Tredegar, and the continued reliance on higher priced goods brought through the blockade continued to affect local prices and wages. These wages had a direct affect on the output of the Tredegar, in terms of outside supplies and support and most especially on raw materials.

Raw materials were mainly in the form of pig iron, copper, nitre and charcoal. Virginia was blessed with an abundance of nitre coal and ores but increasing war production levels, lack of transportation and more and more frequently, harassment of Federal Calvary, constantly added to the burden. By 1863, the Tredegar had expanded its work force to 2,500, nearly three times its prewar number. The works also operated shoemaking shops, a firebrick factory, sawmill, tannery and nine canal boats. Agents were dispatched to purchase livestock, which was slaughtered and sold to employees at cost.(10-762)

In a 25 October 1862 letter from the Secretary of the Navy to the Secretary of War, military forces were requested to assist a commission that had been set up to examine coal and ore deposits in Virginia, with a view to the fabrication of heavy ordinance. (1-143) To further complicate matters, Special Order Number 18 from the Adjutant and Inspector Generals Office of 22 Jan 1863, directed a determination as to what railroads in the South could be dispensed with, so the rails could be used where more urgently needed.(1-366). At that time shortages were critical everywhere. Lead and powder were a particularly pressing problem also. Up to 100,000 pounds of powder had been supplied through the blockade. (9-73)

Perhaps the most crucial time for the Tredegar in the war years, was after the devastating fire of 1863. In May of that year a fire had broken out in the woolen factory immediately adjacent to the iron works, and

rapidly proceeded to destroy a large part of the Tredegar. Badly damaged were two older foundries, including the gun foundry, the old blacksmith shop, the pattern shop, and a large section of the machine shops were completely destroyed. Also, the engine and locomotive shops, the new gun mill and the almost completed lathe for boring the 15 inch gun were destroyed.

Replacement for the damaged equipment would have to come from other shops or from markets abroad. This type of equipment would be more difficult to get through the blockade because of its strategic importance. This was also complicated because of the priorities placed on movement of all war goods, both through the blockade and through inter country shipments. Those making the shipping priorities dealt with requests as they were received and priorities were placed where the most pressing needs were, and this was often not with logistical requirements of back line shops and manufacturing facilities. So the blockade affected production at the Tredegar in many complex ways.

Conclusion & Comparison

Conclusion

This paper has looked at the Tredegar at the mid 1800 time period, just before , during and after the civil war. Although the Tredegar had been functioning well before the war, her early trials and development were important milestones in her contributions to the war effort. As was stated in this paper, manufacturing industry in the South was rather limited, so to have a full fledged iron maker in the Confederacy, and to have her proprietor sympathetic to the secession, was invaluable. Although the Tredegar did not win the war for the South, she played an extremely critical role in the Confederate execution of the war, and as such became an industrial model after which future logistical requirements could be pattered.

Parallels with today's industry and its interrelationship with a war effort, are difficult to draw, however their are several issues that the Tredegar pursued that had direct influences on the outcome of battles and on the state of the progress of the war. After the May 1863 fire, General Anderson could have stated the situation as it was, rather than to be so optimistic about his ability to recover. The Richmond Examiner on May 16, 1863 stated: "What might, therefore, have been a serious national calamity, is a drawback which falls upon and is borne alone by private individuals. While the fire almost completely devastated the entire company, Anderson immediately began to rebuild and continued to supply the Confederate army. Whether Anderson's motives for his public optimism, and his willingness to assume responsibility for rebuilding were motivated by personal desires for profits or for patriotic concerns

for the good of the country, is not known. What is known however, is that his optimistic position made an encouraging impact on the Confederate society and helped the South continue its struggle

While the company did sustain a highly significant loss, Anderson's willingness to carry on was crucial to the Confederacy. As an immediate step to prevent any additional fires, he repurchased two lots where the fire had started. He had sold them nine years earlier for $16,500 and now paid $150,000 to buy them back. This was an obvious determination to continue with the iron works. Production at this point was high, and even though a large number of the recast cannon for General Lee were finished, the fire had an immediate impact on any more production. From May until July, rebuilding was taking place. As an ironic comment to the relative importance of the Tredegar to the war, on the day that General Lee began his retreat from Gettysburg, production operations began again at the Tredegar. Anderson had not completed all of General Lee's requirements for replacement of his Napoleon cannon, and Longstreet's chief of artillery, Porter Alexander could not effectively give the support he needed before Pickett's charge at Gettysburg. The effects of the fire, shortages of raw materials and other causes, did directly affect the war. If quality production could have been maintained, perhaps the Battle of Gettysburg would have been different. It now seems obvious that the logistics issue has far reaching effects on the conduct of war, no matter in what century it occurs.

In considering how well the populace supported the war, it is fairly

easy to see that few other wars have had the public support that the American Civil War had. Upon hearing rumors of an impending battle to be conducted in Pennsylvania, Virginian Judith McGuire wrote: So may it be! We are harassed to death with their ruinous raids, and why should not the North feel it in their homes? I want their horses taken for out cavalry and wagons, in return for the hundreds of thousand that they have taken from us; I want their fat cattle driven into Virginia to feed our army. (5-110) The populace supported the war, and the Tredegar was an institution that furnished tangible optimism and support.

In closely examining the operation of the Tredegar, a direct comparison with a present day company cannot be made, although there are great similarities. It appears that while General Anderson did manage to make profits during the war, profits were not the only motive. Today's industry is driven more on a profit motive, and a quick response to changing situations like General Lee placed on the Tredegar are not likely to happen. Modern day circumstances play such a prominent part in industry that they may not even allow such a rapid response to battlefield requirements. However, many of the same basic patterns remain, and bear more that a cursory look

Constancy Amid Change

In comparing the Tredegar with industry of today, several common factors apply.

1. Money: not enough was allocated or available for the war effort
2. Labor: Strikes, labor unrests and shortages remain constant and real problems.
3. Raw Materials: Constant shortages, not enough and not delivered on time to the manufacturer.
4. Technology: Difficult to accept new techniques, and time consuming to make changes and incorporate new technology into manufacturing processes.
5. Foodstuffs: Food and its timely delivery remains critical.
6. Conflicts between States and Organizations: Parochial views tend to divide efforts and conflict with mission.

So in spite of differences in time, technology and techniques, nothing has really changed that much. Therefore, the pressing need appears to be to maintain good relationships with all forms of industry. Close coordination with suppliers, and understanding of their operations are vital to both side of the system. When the logistics of transportation of corn for the workers at the Tredegar had to be elevated to the Secretary of War for priority on rail shipment, neither side, either government or business, really understood, nor was concerned for the mission of the other. In today's complex world, people problems are such overriding issues, that conduct of a war will be extremely difficult without genuine creativeness on the part of leadership for both industry and government.

Scandals today within the defense industry are commonplace During the Civil War they were also numerous but it didn't seem to gains as much

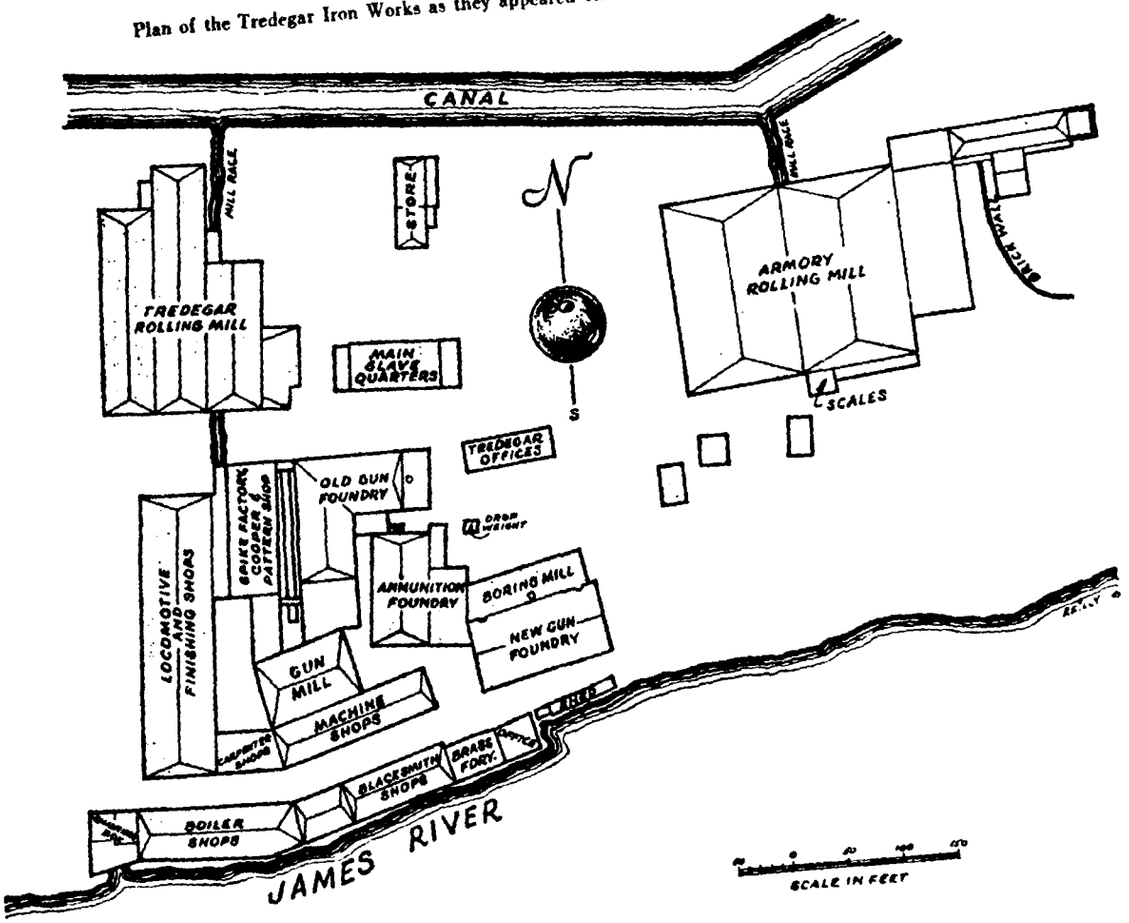
attention. The firm of Fraser & Company in Charleston by 1863 had made $9 million in the blockade running business. (10-762) A governing member of that company was George Trenholm, who was an advisor to the first Confederate Treasury Secretary, and who in 1864 assumed the position of the Secretary. Blockade runners could pay for the purchase of a ship in less that two runs. Agents and operatives also made fantastic profits, all at the expense of the Confederacy. So nothing has really changed. the obvious factor here is that we now know about and study logistics, but much of the study is in lip service alone. Recent events in Granada show difficulties in the same areas of foodstuffs, transportation, basic communication of ideas and in the direct effect of having the right gear on hand at the right place to effect the outcome of a battle. Support by society as a whole is not now as strong as it once was because people are less dependent on each other and are guided by personal objectives rather than national goals. Many fought in the civil war to protect their rights, and for states rights. Today those objectives might be difficult to support.

In summary, nothing really changes in war. People and technology are now more complex and require a great deal more management, but we still need the same basic logistical requirements, and we are still burdened with the same basic problems of logistical support. It is good to study the flow of history, it is full of lessons that must continually be relearned.

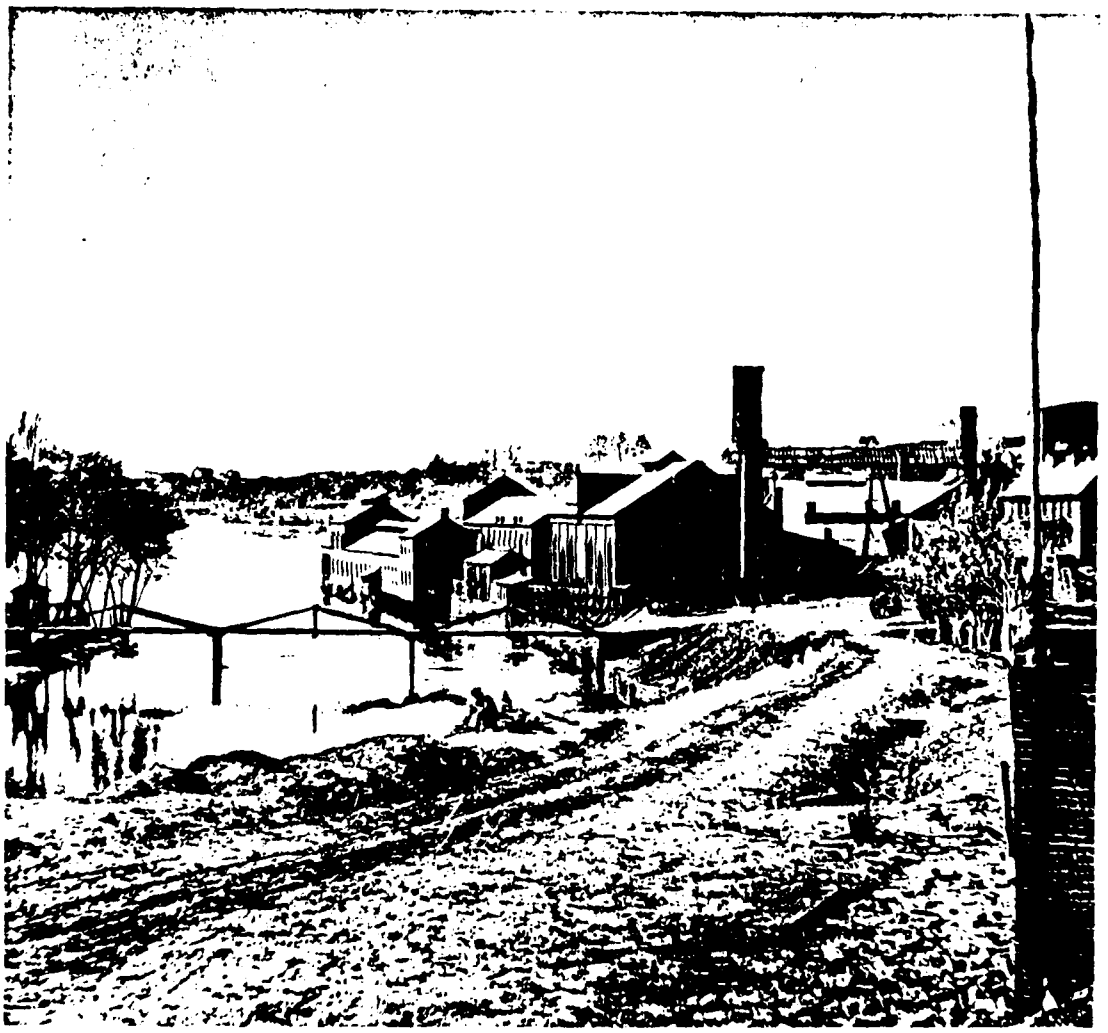
[illegible] general, Confederate States Army. From a photograph taken [illegible] of [illegible]

Taken from Ironmaker to the Confederacy: Joseph R. Anderson and the Tredegar Iron Works, by Charles B. Dew

Plan of the Tredegar Iron Works as they appeared on the eve of the fire in May 1863.



Taken from: Ironmaker to the Confederacy: Joseph R. Anderson and the Tredegar Iron Works, by Charles B. Dew.



An April 1865 view of the Tredegar works from the banks of the James River. The building at the left on the water housed the blacksmith shop and the brass foundry; the new gun foundry stands in the center foreground. The gun mill and the machine shops are located just behind the new gun foundry, parallel to the blacksmith shop and the brass foundry. The two-story building at the far right is the Tredegar office and the large stack just to the left of the office belongs to the *old* gun foundry. The rafters of the burned spike factory and pattern shop are in the right background, behind the old gun foundry. From a photograph taken by Alexander Gardner.

Taken from: Ironmaker to the Confederacy: Joseph R. Anderson and the Tredegar Iron Works, by Charles B. Dew.

A Mathew B. Brady photograph of the Tredegar works, taken in the summer of 1865. In addition to the buildings shown in the previous photograph, this view includes part of the Confederate States Armory (formerly the Virginia State Armory) at the extreme right and the Armory rolling mill (the twin-roofed, open-ended structure at the right). The two story house between the Armory rolling mill and the Tredegar office is the main slave quarters. The low roof of the Tredegar rolling mill is visible in the background between the slave quarters and the Armory mill. The foreground shows the ruins of the Confederate ordnance depot.

Taken from: Ironmaker to the Confederacy: Joseph R. Anderson and the Tredegar Iron Works, by Charles B. Dew.

BIBLIOGRAPHY

1. Ainsworth, Fred C. The War of the Rebellion: A Compilation of the Official Record of the Union and Confederate Armies. Washington, D. C. . Government Printing Office, 1901.

2. Bruce, Kathleen. Slave labor in the Virginia Iron Industry. Williamsburg, Va.: William and Mary College Quarterly, 1925.

3. _____. Economic Factors in the Manufacture of Confederate Ordnance. Washington, D.C.: The Army Ordnance Association, 1926.

4. Bullock, Jerry D. The Secret Service of the Confederate States. New York: Sagamond Press, Inc., 1959.

5. Channing, Steven A. Confederate Ordeal: The Southern Home Front. Alexandria, Va. Time Life Books, 1984.

6. Dew, Charles B. Ironmaker to the Confederacy: Joseph R. Anderson and the Tredegar Iron Works. New Haven, Ct. Yale University Press, 1966.

7. Faust, Patricia L., ed. Historical Times Illustrated Encyclopedia of the Civil War. New York: Harper & Row, 1986.

8. Goff, Richard D. Confederate Supply. Durham, NC . Duke University Press, 1969.

9. Gorgas, Josiah. "Notes on the Ordnance Department of the Confederate Government." Southern Historical Society Papers Volume 12, 1884.

10. Mallett, John W. "Work of the Ordnance Bureau of the War Department of the Confederate States, 1861-1865." Southern Historical Society Papers Volume 37, 1909.

11. Richmond Times and Compiler, Richmond, Va., May 28, 1847.

12. Thompson, Samuel B. Confederate Purchasing Operations Abroad. Chapel Hill: University of North Carolina Press, 1935.